

REMARKS

Claims 1-3, 7-9, 13, 14, 16 and 18-29 remain pending in this application.

Claims 1 and 13 have been amended to define still more clearly what Applicants regard as their invention. Claims 4 and 15 have been cancelled without prejudice. Claims 1 and 13 are in independent form. The specification has been amended to correspond to the changes made to Figures 1 and 12 with regard to the section lines. Favorable reconsideration is requested.

Claims 1-4, 7, 13-15 and 18 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claims 1 and 13 have been amended to no longer recite that the objected-to term "directly" connected. The rejection is believed obviated.

The Office Action rejected Claims 1-3, 7, 13, and 18, under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art (APA) in view of U.S. Patent No. 5,467,210 (Kishigami). In addition, the Office Action rejected Claims 4 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Applicants' admitted prior art in view of Kishigami and further in view of U.S. Patent No. 5,311,341 (Hirai). Cancellation of Claims 4 and 15 renders their rejection moot.

Applicants submit that independent Claims 1 and 13 are patentably distinct from the cited prior art for at least the following reasons.

Claim 1 is directed to a circuit connection structure. The structure includes a first substrate that forms a display panel that has electrode terminals formed thereon. A semiconductor device has first electrodes and second electrodes with the first electrodes being connected to the electrode terminals of the first substrate. A flexible wiring member is disposed in a lateral position with respect to the first substrate having thereon a pattern of conductors, each extending from a first conductor end to a second conductor end on the flexible wiring member with the first conductor ends of the conductors connected to the second electrodes of the

semiconductor device. A circuit board is disposed with a space from the first substrate and has electrode terminals connected to the second conductor ends of the conductors on the flexible wiring member. The semiconductor device bridges the space between the first substrate and the circuit board. The second conductor ends of the conductors on the flexible wiring member are connected to the electrode terminals of the circuit board, and the output electrodes of the semiconductor device are connected to the electrode terminals on the at least one substrate of the display panel, respectively, with an anisotropic conductive adhesive.

The position was taken in the Office Action that Figure 13 of the instant application shows the feature "wherein said semiconductor device bridges the space between the first substrate and the circuit board." This is incorrect. In Figure 13, the semiconductor device (5p) is disposed entirely above the circuit board (3p) and does not bridge the space between the circuit board (3p) and the first substrate (1bp).

Kishigami fails to remedy this deficiency of prior art Figure 13. As shown in Kishigami's Figures 1 and 4, Kishigami shows a semiconductor device (21) that is placed entirely on substrate (13). As understood by Applicants, the structure of Kishigami's Fig. 4 is nothing more than the prior art connection structure discussed at page 3, line 7 to page 4, line 14 of the present specification.

Moreover, Kishigami fails to provide any motivation for partly shifting the position of the semiconductive device (5p) of the APA toward the first substrate (1bp) and connecting only one of two electrodes (i.e., first and second electrodes) of the semiconductor device (5p), while leaving the other electrode's connection with the flexible wiring member (4ap), to provide the semiconductor device bridging structure of the claimed invention. Such claimed structure provides the following advantages:

(a) a liquid crystal display panel (comprising a first substrate (1b)) is provided with a larger area of effective display region (without using a large area for setting a semiconductor device (5) on the first substrate (1b)),

(b) the length of the flexible wiring member (4a) liable to cause an increase in input wiring impedance to the liquid crystal panel is minimized to a length that is required to connect between the circuit board (3) and the semiconductor device (5) striding over the circuit board (3), thus effectively suppressing the increase of input wiring impedance, and

(c) the semiconductor device (5) disposed to bridge the space between the first substrate (1b) and the circuit board (3) functions to suppress a relative movement between these members, thereby suppressing a stress caused by the relative movement from acting on the flexible wiring member (4a), whereby a failure of connection with the flexible wiring member (4a) is minimized.

While Hirai teaches use of an anisotropic conductive adhesive, it fails to teach or suggest the use of such an anisotropic conductive adhesive for bonding two different conductor ends of an electrical unit as a bridging connection structure over to two different types of substrates. Of course, Hirai fails to remedy the above-mentioned deficiencies of the prior art references mentioned above.

Applicants submit that a combination of Applicants prior art and Kishigami, assuming such combination would even be permissible, would fail to teach or suggest the features of Claim 1.

The aspect of the present invention set forth in Claim 13 is directed to a display apparatus. The apparatus includes a display panel that is made up of at least one substrate that has pixel electrodes which extend to form electrode terminals on a peripheral side of the substrate. A semiconductor device has input electrodes and output electrodes for supplying drive

waveforms to the pixel electrodes of the display panel. A circuit board is disposed with a space from the display panel and has electrode terminals for supplying an electric power and control signals to the semiconductor device. The electrode terminals on at least one substrate of the display panel are connected to the output electrodes of the semiconductor device and the semiconductor device is connected to the circuit board via a flexible wiring member that is disposed in a lateral position with respect to the substrate that has a pattern of conductors, each extending from a first conductor end to a second conductor end so that the input electrodes of the semiconductor device are connected to the first conductor ends of the conductors on the flexible wiring member. The second conductor ends of the conductors of the flexible wiring member are connected to the electrode terminals of the circuit board, and the semiconductor device bridges the space between the display panel and the circuit board. The second conductor ends of the conductors on the flexible wiring member are connected to the electrode terminals of the circuit board, and the output electrodes of the semiconductor device are connected to the electrode terminals on the at least one substrate of the display panel, respectively, with an anisotropic conductive adhesive.

For reasons similar to those discussed above with reference to Claim 1, Applicants submit that a combination of Applicants' prior art and Kishigami would fail to teach or suggest a display apparatus as recited in Claim 13. Claim 13 has been amended similarly to Claim 1 and is believed even more clearly patentable for the reasons discussed above with respect to the added feature.

Accordingly, Applicants submit that Claims 1 and 13 are patentable over the cited art, and respectfully request withdrawal of the rejection under 35 U.S.C. § 103(a).

The other rejected claims in this application depend from one or another of the independent claims discussed above, and, therefore, are submitted to be patentable for at least the

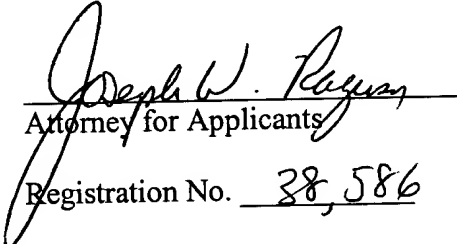
same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

This Amendment After Final Rejection is believed clearly to place this application in condition for allowance and its entry is therefore believed proper under 37 C.F.R. § 1.116. At the very least, however, entry of this Amendment After Final Rejection, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,


Attorney for Applicants
Registration No. 38,586

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

NY_MAIN 257231 v 1



VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Four Times Amended) A circuit connection structure, comprising: a first substrate forming a display panel having electrode terminals formed thereon, a semiconductor device having first electrodes and second electrodes with the first electrodes [directly] connected to the electrode terminals of the first substrate, a flexible wiring member disposed in a lateral position with respect to the first substrate having thereon a pattern of conductors each extending from a first conductor end to a second conductor end on the flexible wiring member with the first conductor ends of the conductors connected to the second electrodes of the semiconductor device, and a circuit board disposed with a space from the first substrate and having thereon electrode terminals connected to the second conductor ends of the conductors on the flexible wiring member,

wherein said semiconductor device bridges the space between the first substrate and the circuit board, and

the second conductor ends of the conductors on the flexible wiring member are connected to the electrode terminals of the circuit board, and the first electrodes of the semiconductor device are connected to the electrode terminals of the first substrate, respectively, with an anisotropic conductive adhesive.

13. (Four Times Amended) A display apparatus, comprising:

a display panel comprising at least one substrate having thereon pixel electrodes extending to form electrode terminals on a peripheral side of the substrate,

a semiconductor device having input electrodes, and output electrodes for supplying drive waveforms to the pixel electrodes of the display panel, and

a circuit board disposed with a space from the display panel and having electrode terminals for supplying an electric power and control signals to the semiconductor device; wherein

the electrode terminals on at least one substrate of the display panel are [directly] connected to the output electrodes of the semiconductor device, and

the semiconductor device is connected to the circuit board via a flexible wiring member disposed in a lateral position with respect to the substrate having thereon a pattern of conductors each extending from a first conductor end to a second conductor end so that the input electrodes of the semiconductor device are connected to the first conductor ends of the conductors on the flexible wiring member, and the second conductor ends of the conductors of the flexible wiring member are connected to the electrode terminals of the circuit board,

wherein said semiconductor device bridges the space between the display panel and the circuit board, and

the second conductor ends of the conductors on the flexible wiring member are connected to the electrode terminals of the circuit board, and the output electrodes of the semiconductor device are connected to the electrode terminals on said at least one substrate of the display panel, respectively, with an anisotropic conductive adhesive.



VERSION WITH MARKINGS TO SHOW CHANGES MADE TO SPECIFICATION

The paragraph beginning at page 2, line 2 has been amended as follows:

--Figure 12 and Figure 13 (a view showing [an A-A'] a 13-13 section in Figure 12) illustrate an example of such a drive circuit connection structure for a flat display panel. Referring to these figures, the connection structure includes TCPs 4ap and 8p loaded with driver ICs (as drive semiconductor circuits) 5p and 9p and copper foil patterns 32 (as output electrodes), glass substrates 1ap and 1bp for a liquid crystal panel 1 having electrode terminals 12p extended to peripheries thereof, and ACFs (anisotropic conductive films or anisotropic conductive adhesive) 31 for heat-bonding the copper foil patterns 32 on the TCPs with the electrode terminals 12p on the glass substrates. Further, PCB boards 3p for supplying a power and control signals to the driver ICs 5p and 9p are connected with copper foil patterns 17 (as input electrodes) of the TCPs 4ap with solder 20p.--

The paragraph beginning at page 8, line 14 has been amended as follows:

--Figure 2 is a partial sectional view taken along a line [A-A'] 2-2 in Figure 1.--

The paragraphs beginning at page 9, line 9 and page 9, line 16, respectively have been amended as follows:

--Figure 13 is a partial sectional view taken along a line [A-A'] 13-13 in Figure 12.--

--Figure 1 is a plan view of a liquid crystal display apparatus, as an embodiment of display apparatus, including a drive circuit connection structure according to a first

embodiment of the present invention, and Figure 2 is a sectional view taken along a line [A-A']
2-2 in Figure 1. In Figures 1 and 2, reference numerals identical to those used in Figures 12 - 13
denote identical or like parts as in Figures 12 - 13.--

NY_MAIN 258825 v 1